

NEW ZEALAND  
THERMAL-SPRINGS DISTRICTS.

PAPERS RELATING TO THE SALE OF THE  
TOWNSHIP OF ROTORUA,

*Established under "The Thermal-Springs Districts Act, 1881,"*

WITH MAPS AND PLANS OF THE DISTRICT AND TOWNSHIP:

TOGETHER WITH

*Information relating to the Hot-Springs Districts, and a Report on  
the Mineral Waters.*

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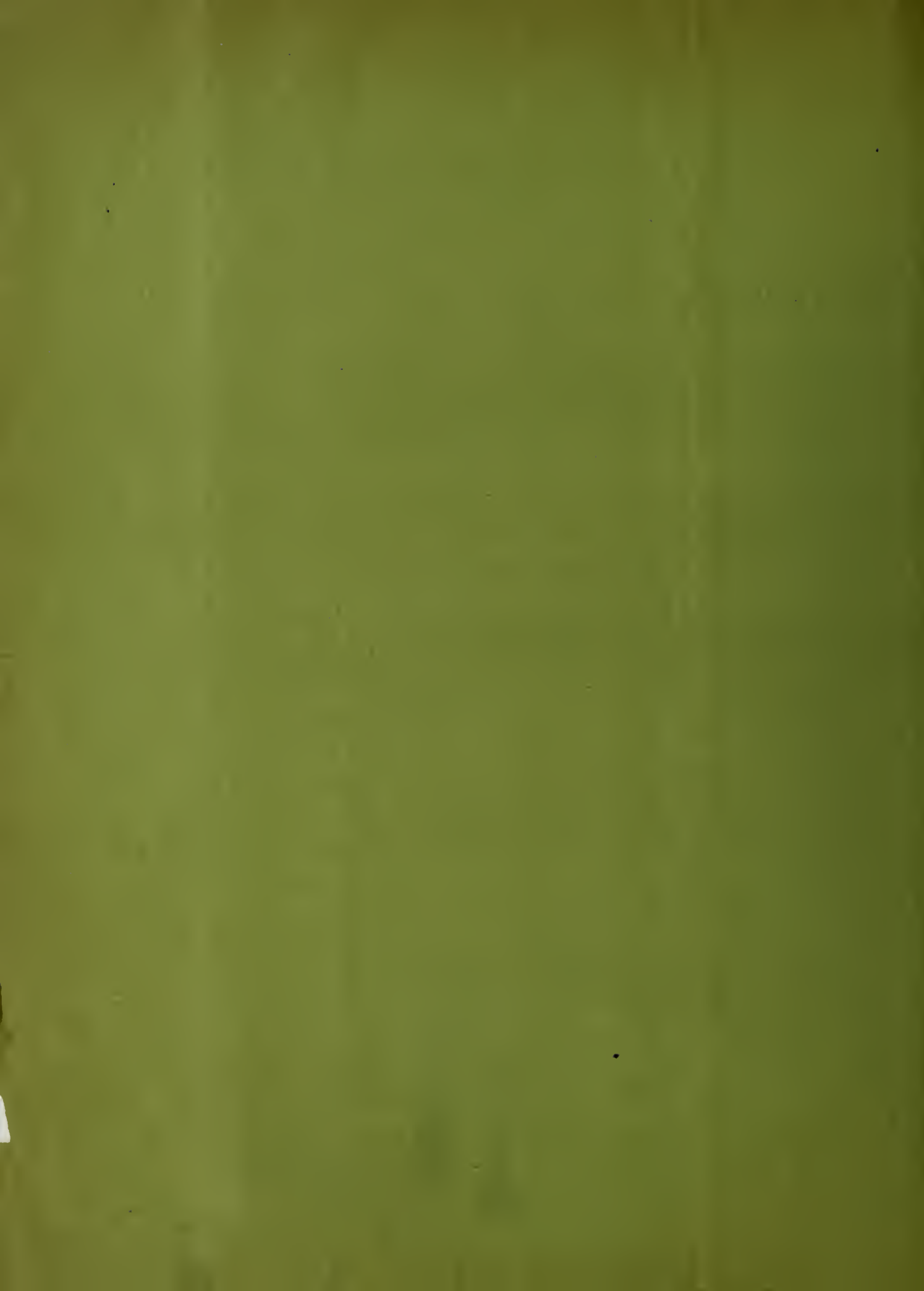
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NEW ZEALAND.

BY AUTHORITY. GEORGE DIDSBURY, GOVERNMENT PRINTER, WELLINGTON.

1882.



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## ANNOUNCEMENT.

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THE Township of Rotorua will be the first land offered for public selection under the operation of "The Thermal-Springs Districts Act, 1881," in order to lose no time in rendering available the wonderful curative properties of the mineral springs in the vicinity of Lake Rotorua.

A Medical Officer has been appointed in charge of the district, whose services will be at the disposal of invalid visitors on payment of usual fees for medical attendance, and he will be able to receive a certain number of private patients for treatment at his official residence.

A hospital is in course of erection, at which public patients, sent at the expense of hospitals and charitable institutions in other parts of the colony to get benefit from the springs, will receive gratuitous medical attendance.

A pavilion is being erected in the vicinity of the most highly-esteemed springs, which is to be fitted up with baths and every convenience necessary to enable patients to derive full advantage from the use of the mineral waters. Four different kinds of mineral waters, having distinct therapeutic properties, will be laid on to these baths. An attendant will be appointed in charge of the baths, whose duty will be to maintain them in a thorough state of cleanliness and comfort, and to supply the wants of bathers for a moderate fee.

Bathing-sheds for the convenience of the public will also be built at several of the more remote springs.

A dispensary will be opened close to the baths, with a consulting-room attached, when at stated hours the Medical Officer can receive patients seeking his advice.

A laboratory is also to be attached for the purpose of facilitating a thorough analysis and study of the composition and therapeutic values of the various mineral waters, so that, by their use, a definite line of treatment in different forms of disease may be arrived at. With the view of obtaining the experience gained of the medicinal action of the waters in a precise form, it will be the duty of the Medical Officer to keep case-books, and to make reports that will be of service for the information and guidance of medical practitioners in other places, who may desire to recommend invalids to resort to the springs for the benefit of their health.

The laying-out of the recreation reserve, the planting of street avenues, and other improvements of a similar nature are to be at once commenced.

Experiments are being made for the supply of artesian water for the use of the town, and, failing that, a gravitation scheme of water-supply will be introduced.

All other requirements for the accommodation and recreation of tourists and invalids will be left to private enterprise and to the Board of Management, which will be appointed under clause 10 of the Act.

The best residence sites, commanding a view of the lake, and situated on the slopes of Pukeroa Hill adjacent to the park, will be offered in half acre lots as single villa sites, under covenant restricting their use to purposes of residence only.

## TERMS OF SALE.

The lots as marked on the plan will be let in leases for ninety-nine years, under arrangement made by the Government of New Zealand with the proprietors of the soil.

The letting will be by auction, at the Office of the Commissioner of Crown Lands, in Auckland, on the 7th of March, 1882.

Rents will be payable half-yearly, the first half-year being paid on the day of sale.

All mineral waters, hot springs, and streams are and remain vested in the Crown.

The reserves for schools, post office, telegraph office, railway, hospital, and other public objects will be shown on the maps on the day of sale.

The recreation-grounds will be reserved for the public, and will be under the management of a local body.

There will be a resident medical officer, appointed by the Government.

The government of the town will be by a local body constituted under the Act.

Some of the building sites, peculiarly suitable for residences, will be let subject to restrictions as to use for trades or shops.

The hotels and lodging-houses will be governed by regulations suitable to the exceptional character and requirements of the town.

Rents will be paid half-yearly, in Auckland, or in the town, as may be found convenient.

Possession of the land will be given immediately after the auction. The lots may be now identified on the ground by marked pegs.

The use of the waters, and all similar arrangements, will be under the control of the doctor and a local body.

Wellington, 24th December, 1881.

W. ROLLESTON,  
Minister of Lands.

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## THE THERMAL-SPRINGS DISTRICTS.

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Native Land Court Office,  
Auckland, 19th October, 1881.

I HAVE now the honor to send you, in accordance with your request, a compilation of the papers which it appears to me desirable to print for the information of the public, in anticipation of the sale of the site of the proposed town in the Lake Country.

It may surprise persons living at a distance to learn that these wonderful places have only now been made available for colonization and settlement; but the residents of New Zealand are well aware of the tenacity with which the Maoris have maintained the seclusion in which it was their policy that this part of the colony should be kept, and that it is only now for the first time in our history that Government has managed to obtain terms insuring to settlers undisturbed possession and perfect title.

I do not think that it would be advisable to hold the sale of the township lots before February, and there would be time then to get houses built before winter. You are aware that the forests on the other side of the lake contain vast quantities of timber of the finest quality for house-building, and that it is quite available. The upset price of the town lots I submit to the better judgment and greater experience of the Crown Lands officers.

The proposed railway will add greatly to the value of the town lands, for, although the present road is very good in summer, it is trying to invalids in winter, when it gets much cut up. I think that the names of the promoters of the railway afford ample guarantee of their ability and means to construct and maintain it, and the large stake which each director has taken in the undertaking shows the perfect faith which they have in its profitableness. I need not add that having a large town on its line, with a constant stream of visitors, will also largely benefit the railway.

I take the opportunity of inviting attention to the fact that the Proclamations which have been issued under the Act render impossible the acquisition of any lands in this part of New Zealand by any individual except under the authority of the Act itself, so that all future purchasers will have to look to the same process as that now presented.

I have, &c.,  
F. D. FENTON,  
Chief Judge, Native Land Court.

The Hon. Mr. Rolleston, Minister of Lands.

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## DESCRIPTION OF THE SITE OF THE PROPOSED TOWN OF ROTORUA,

*By S. Percy Smith, Esq., Chief Surveyor of the Auckland District.*

THE site has been chosen on the southern shores of Lake Rotorua, immediately to the south-east of the celebrated ancient Maori village of Ohinemutu. The reasons that have weighed in selecting it here are these: Firstly, because in this spot the largest number of healing springs are found in close proximity; secondly, from its advantageous position as a centre from which the numerous natural wonders and beautiful scenery of the Lake District can most easily be reached; and thirdly, from the fact that in this spot several of the main lines of communication of the country meet. The township contains an area of 600 acres, of which only about 125 acres have at present been subdivided for sale, the balance being retained for future extension. A few half-acre villa sites have been laid off, but each business section contains about a quarter of an acre. The streets are a chain and a half wide, excepting Fenton Street, which is two chains wide, and runs from the shore of the lake in a direct line for the great Geyser of Whakarewarewa, an intermittent boiling fountain, which, when in action, throws up water to a height of 40 feet, accompanied by clouds of white steam.

Ample reserves have been made for all public purposes, and a hospital and bath-houses will be provided for the convenience of invalids, the building of which has been commenced; whilst the innumerable hot, sulphurous, and gaseous springs, and natural baths, have all been retained for the use of the public. On either side large reserves for recreation purposes have been left, which, when planted, will add greatly to the beauty of the spot. Experiments are being made for supplying artesian water, failing which an ample supply of delicious water for the future town can readily be obtained from the Puarenga Stream. In the gorge through which this stream passes, a short distance away, nature seems to have provided the very place for an extensive reservoir at a height sufficient to carry the water 100 feet above the level of the town.

Timber for building purposes grows in abundance on the ranges near, or along the shores of Rotorua and Rotoiti Lakes, whilst a grey-coloured stone (silicious sintcr), formed by deposits from hot springs now extinct, exists in considerable quantities within the boundaries. The surface of the country is a plain, but with a gentle easy slope from the south-west to the shores of the lake, excepting in the Pukeroa Reserve, where it rises to an elevation of about 100 feet above the lake. It thus affords great facilities for drainage. The water of the lake at a distance from the northern front is drinkable, but on the eastern side is so strongly impregnated with sulphur as to be unfit for use.

It would be impossible here to enumerate the various mineral springs which abound within or are immediately adjacent to the township. Their number is very great, and they are of all kinds, from the boiling cauldron of Oruawhata to the tepid springs of the lake shore; from the cold sulphurous springs in the large reserve near the sanatorium to the scalding steam jets of Sulphur Point, which deposit the most beautiful crystals of pure sulphur in large quantities. Their healing properties are already known, and have a world-wide fame.



It is the intention hereafter to plant the Pukeroa Reserve, and lay out drives, as a public park. From the highest point—the parapet of the old redoubt, some 100 feet above the lake level—a fine view is obtained over the town site, the adjacent lake, the Native Village of Ohinemutu, with its innumerable hot and boiling springs (amongst which must be mentioned the occasional Geyser of Waikite), the Island of Mokoia, so famous for its history, and the encircling ranges of forest-clad hills forming the basin of Rotorua.

Immediately adjacent to the township a few suburban 5-acre and 10-acre sections have been laid out, whilst outside these a number of small farms ranging from 40 acres to 60 acres have been provided for, with a large reserve at Arikikapakapa, another centre of boiling springs, mud volcanoes, and sulphurous lakelets, much resorted to for their medicinal virtues. Higher up, on the slopes of the ranges, are some sections which, from the beauty of their situation and the charming views to be obtained across the plain and lake, will form delightful suburban residences.

At the distance of a mile and a half from the centre of the town, on the banks of the Puarenga Stream, is situated a large group of hot and boiling springs, known under the general name of Whakarewarewa. Here the great geyser sometimes throws a column of boiling water high into the air, whilst a smaller one is almost in constant action, delighting the beholder with its beautiful and ever-varying form. The white silicious deposit from these forms terraces like those at Rotomahana, but on a very much smaller scale, and not so beautiful. The boiling springs, deep marble-like basins filled with hot water, and countless escaping jets of steam cover several acres in this locality, all of which, from their close proximity to the township, will form a great additional attraction.

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### SURROUNDING DISTRICT.

From Ohinemutu it is easy to visit the other points of interest in the district. A coach-road for a distance of ten miles leads past the Tikitapu Lake, whose waters are of a deep indigo blue, and past the end of Rotokakahi Lake to the Native Village of Wairoa, with its European hotels. From here the visitor, after seeing the falls on the river, will cross Lake Tarawera for six miles by boat, landing at Te Arika, its southernmost bay, and thence by a footpath, or sometimes by canoe, up the warm stream of Kaiwaka for a mile and a half to the far-famed White and Pink Terraces of Rotomahana. Starting again from Wairoa a bridle-path leads along the western shore of Tarawera Lake to the pretty Falls of Waitangi, where a divergence of half a mile to the west will lead to Okarika, a pretty lake, partly surrounded by wooded hills. By continuing onwards along the path from Waitangi for another four or five miles Okataina Lake is reached, which is considered by some to exceed in beauty all the other lakes in the district.

Starting again from Ohinemutu, by the Maketu Road, a drive of eight miles will lead to the old Mission Station of Te Ngae, and from there a road leads to Tikitere Hot Springs, where some wonderful sulphur deposits occur with hot springs, a hot waterfall, and baths of wonderful efficacy in the cure of certain diseases. A walk of a mile through a pretty forest will bring the visitor to a charming little lake called Rotokawau, surrounded by forest-clad hills and with perpendicular white cliffs descending to the water's edge. Continuing on from Tikitere by the Native path, winding along the shores of Rotoiti, the Manupirua Hot Springs are passed, which are celebrated for their "mana," or powerful healing properties, whilst a further advance of some seven miles will reach Tapuaeharuru, the Native village at the east end of Rotoiti, situated amongst some romantic

scenery. A Native path leads from here for two miles to Rotoehu, another lake, with long winding arms; and two miles farther brings the visitor to Rotoma, probably the most beautiful of the lakes, surrounded by hills, clothed with ever-green trees to the water's edge, with white sandy beaches and bluff headlands.

Returning to the shores of Rotoiti a path branches off to the south, through the forest, to Okataina Lake, a distance of some ten miles from Tapuaeharuru. From here it is usual to take a Maori canoe across the lake, and thence over the hills a short distance to Tarawera, where the track to Wairoa Village is met with, or Tarawera may be crossed by canoe or boat to Waitangi, and so back to Ohinemutu by road.

For those who are fond of boating, a sail across Rotorua, with a passing visit to Hinemoa's bath on Mokoia Island, and thence by the river connecting the former lake with Rotoiti, and by the waters of that lake for eight or nine miles, will bring the visitor to Tapuaeharuru again. Rotoiti has some fine scenery on it, and presents innumerable camping-places for pleasure-seekers.

These are the ordinary excursions made by visitors to the Lake District. Ten days will suffice for them, but the objects of interest beyond those roughly enumerated within the Thermal-Springs District are so numerous, and, indeed, so comparatively unknown, that two months spent in exploring them would fail to exhaust all that is to be seen.

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## ROUTES.

There are several routes by which the lakes are reached. The principal are as follows:—

1. By steamer leaving Auckland at 5 p.m. twice a week for Tauranga, 135 miles, with a generally smooth sea, and thence by carriage along a good summer road to Ohinemutu, 42 miles, of which 18 are through forest. The journey occupies twenty-four hours.

2. By steamer leaving Auckland daily to the Thames, about four hours passage; thence by steamer up the Thames River and Ohinemuri River to Paeroa, four hours, or by road about three hours' ride, passing on the way the soda spring at Puriri; from Paeroa to Katikati by road, about four hours. On the way the mines at Owharoa and Lower Waitekauri might be visited, as also some fine scenery when passing through the Ohinemuri Gorge. From Katikati to Tauranga either by steamer or road, about five hours; thence to lakes as previously stated.

3. By train daily from Auckland to Hamilton, 84 miles; thence by coach, 14 miles, to Cambridge; and from there by the new road, now constructing, to Ohinemutu, a distance of 52 miles, of which 26 are available for vehicles: the rest is at present only a bridle-road, of which 10 miles are through forest. This route takes two days in summer, but is not suitable for winter at present.

4. A deviation from the above, starting from Cambridge to Waotu by carriage, 25 miles; thence by horse 50 miles to Ohinemutu *viâ* Horohoro and the Patetere country. This route will take three days.

5. Visitors from the South often land at Napier and take the coach twice a week to Lake Taupo, 94 miles; and thence by carriage to Ohinemutu, 50 miles; or this may be varied by a ride from Taupo *viâ* Orakeikorako, where are to be seen some wonderful hot springs, geysers, the Alum Cave, and some fine scenery on the Waikato River; thence by the foot of the Paeroa Mountain, another hot-spring locality, to Ohinemutu, about 45 miles. This journey takes three days from Napier, or four *viâ* Orakeikorako.

6. A route will shortly be available from Tauranga, crossing the harbour by Hairini Bridge, and along the carriage road now constructing to Te Puke Settlement, and thence by the Maketu-Rotorua Road to Ohinemutu, about 50 miles.

7. Another route in the not-far-distant future will be by train from Auckland to Hamilton; thence by Te Aroha line to Morrinsville; and thence by train to Ohinemutu by the Rotorua Railway, the formation of which has been undertaken by a company.

8. The following is a Table of Routes by which Auckland may be reached:—

London, <i>viâ</i> New York and San Francisco, to Auckland, by steam	...	41	days.
London, <i>viâ</i> Melbourne and Sydney (Orient Line), to Auckland, by steam	...	45	„
London to Auckland, by sailing ship	... ..	90	„
Calcutta, <i>viâ</i> Point-de-Galle and Sydney, to Auckland, by steam	...	30	„
Sydney to Auckland, by steam	... ..	5	„
Melbourne to Bluff	... ..	5	„
Hobart to Bluff	... ..	4	„
Bluff to Wellington	... ..	3	„
Wellington to Napier	... ..	1	„
Napier to Auckland	... ..	2	„
Wellington, <i>viâ</i> Nelson and Manukau, to Auckland, by steam	...	3	„
Dunedin to Auckland, by steam	... ..	5	„
Christchurch to Auckland, by steam	... ..	4	„

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## REMARKS ON THE HOT-SPRINGS DISTRICTS, NORTH ISLAND,

*By the Hon. Sir W. Fox, K.C.M.G.*

Wellington, 1st August, 1874.

THE hot-spring country is well defined by Dr. Hochstetter as commencing at the northern base of Ruapehu and Tongariro Mountains, at the southern end of Lake Taupo, and thence extending in a north-easterly direction, for a distance of about 150 miles, to White Island, in the Bay of Plenty, being for the whole distance about the same width as Taupo Lake, say twenty-five to thirty miles, and possibly fed by an underflow from that lake. A few springs not included in that area may be found in other parts of the Island, as at Tarawera, fifty miles from Taupo, on the Napier Road, and at Mahurangi, in the country north of Auckland, and a few other localities. But these are insignificant in comparison with those which lie within the limits above defined.

There are some half-dozen sites in the country referred to in which the number of springs and other active volcanic agencies are so great as to afford almost unlimited facilities for the establishment of sanatory institutions, and it is to these that I wish to draw the particular attention of the Government. Before doing so, however, it may be well to distinguish the different forms in which the heated water and steam emerge from the subterraneous reservoirs and appear on the surface. They are classified by Hochstetter under three heads: 1. *Puias*, which are geysers continuously or intermittently active. 2. *Ngawhas*, which are inactive *puias*, emitting steam, but not throwing up columns of hot water. 3. *Waiarikis*, which signifies any sort of cistern of hot water suitable for bathing. The lines of distinction are perhaps not always very well defined. To these may be added mud volcanoes, and numerous creeks and streams either entirely hot, or tepid, or cold with occasionally hot springs breaking into them and raising their temperature for several yards around. This feature also occurs in some of the lakes, as Rotorua and Rotomahana.

I will now proceed to describe the localities which, from their wealth of hot springs and fumaroles, appear more particularly adapted for sanatory purposes and the establishment of hydropathic institutions.

Beginning at the southern extremity of the district above defined—that is, at the southern end of Lake Taupo—there is, at Tokaano, a very largely-developed group of active and quiescent springs. The Native village which bears that name is erected in the midst of them, and they are used for the various purposes of bathing, cooking, and other domestic uses, by a population of two or three hundred souls. The principal bath consists of a deep *ngawha* between two boiling *puias*—the two outer ones, above and below, being boiling hot, or nearly so, while the central one is of a temperature of not more than 100° to 110°, and therefore very pleasant for bathing. Its heat can be increased or diminished at will by shutting off its connection with the upper *puia*, which is easily done with a sod or a bunch of fern leaves. The bathing pool is about six yards in diameter, and its construction is convenient and peculiar, consisting of a deep central channel which cannot be bottomed by diving, surrounded by a shelf of a yard or two wide, on which the water is only two or three feet deep. This affords accommodation both



to the expert swimmer and to those who have not acquired that useful accomplishment.

A fine clear creek of cold water, five or six yards wide, runs through the settlement, on both shores of which are many *puias* and *ngawhas*, some violently boiling and others of various degrees of heat and ebullition. Some of these already mingle their waters with the cold creek, rendering it for a few yards a pleasant warm bath, and in many more places the hot and cold water could easily be led into each other, so as to provide an almost unlimited number of baths of any temperature which might be desired.

Tokaano has a special importance relating to the settlements of Whanganui and other places on the West Coast, from which it will be easily accessible when the road now under construction is finished. The bathing facilities, however, at present, can only be used in common with the Natives, who morning and evening resort to the principal bath in such numbers as often to completely fill it. If they should continue to occupy Tokaano, it would be necessary to utilize some of the other springs or cisterns in the neighbourhood for those who might prefer privacy to the communistic lavatory system of the Natives.

Besides the existence of great bathing facilities, Tokaano offers many other objects of interest to the tourist or valetudinarian. Yachting on the lake; excursions to the falls of Waihi, and the place of Te Heu Heu's sepulture beneath a vast landslip which engulfed his village and a large number of his people; the ascent of Tongariro, and possibly of Ruapehu (a feat not unworthy of the foremost members of the Alpine Club),—such features confer attractions on Tokaano which ought some day to establish it as one of the most favourite resorts of the district.

Leaving Tokaano, there are, I believe, no springs worthy of notice along the eastern shore of the lake till the northern end is reached at Tapuaeharuru, where the Waikato River, which flowed in near Tokaano, flows out again, much after the fashion of the Rhone through the Lake of Geneva,—with this difference, however, that, while the blue colour of the Rhone has passed into a proverb, the waters of the Waikato are of an equally lucid and transparent green, unsullied by any trace of muddy deposit or milky tinge from the snow-water weepings of Ruapehu.

On the western banks of the Waikato, where it leaves the lake, stands on a jutting promontory an old Maori pa, with some rather fine but rapidly-decaying remains of ornamental gateways and barge-boards. On the eastern bank is the Constabulary barrack, and the surveyed site of a township, which consists at present of a single publichouse and store.

The bright waters of the lake—green, transparent, and cool, and the eddying stream of the Waikato, afford excellent opportunity for cold-water bathing, while at no great distance are hot springs which might be easily turned to account. Of these there are three principal groups:—

1. About two miles below Tapuaeharuru is a group of *puias* and *ngawhas*, the chief of which is an intermittent one known as the Crow's Nest. It occasionally throws up a column of hot water 10 or 15 feet high, but was formerly more energetic and may be so again. Close to it are several less violent but very hot *ngawhas*, close to the edge of the river, affording great facility for intermixing and regulation of temperature. A person once erected a bath here, with appliances for mixing the hot and cold water, but the number of bathers was not remunerative, and "Mac's bath," as it was called, has gone out of repair.

2. About half a mile eastward from the river is a small swampy flat, at the foot of an irregular cliff of 30 or 40 feet high, through which flow two small streams of a yard or two wide, one barely tepid, the other too hot to handle. At the point where the two unite a tolerably good bath has been erected by John

Loffley, formerly an A.B. sailor in Her Majesty's Navy, who served in the Naval Brigade during the Waikato war. A dressing-room is annexed, and Loffley has a small house in the neighbourhood, where he occasionally receives an invalid boarder. He has made attempts to clear and plant the six or eight acres of adjacent swampy land, and generally shows a creditable degree of energy in endeavouring, with very limited means, to develop the hygienic resources of the two streams over which he presides as a sort of river god.

3. At the distance of a mile and a half from the Constabulary post and township, along the eastern shore of the lake, a warm stream a yard or two wide crosses the road and meanders into the lake. Following it inland by a Maori track a narrow gorge is reached, in which the small stream expands into two considerable pools, varying in depth from a few inches to several feet. They are both of considerable temperature, and a favourite resort of neighbouring Natives, who, however, are few in number. These pools are not at present very accessible, and their banks are encumbered with raupo and rushes, presenting no very pleasant accommodation for bathers. The water has also a dingy and unattractive hue; and, though capable of containing many bathers at a time, would require a good deal to be done to make the locality a place of general resort. The water, also, is probably much diluted and less charged with alkaline and other medicinal substances.

Besides these three principal bathing-places, there are numerous fumaroles and steam jets in the surrounding country; one in particular near the coach road, which forms a marked feature, and is, I conceive, the same described by Hochstetter under the name of Karapiti. This fumarole and the surrounding fissures might probably be utilized as steam baths.

Before passing on from Taupo I may observe that its northern end is not without some attractions for the excursionist, though it does not present scenery of the highest class. Some writers (even Hochstetter) have expressed themselves in terms of rapturous admiration of the scenery of this lake. I cannot, however, think that any one familiar with the more remarkable lakes of the world, and even of those in New Zealand, such as Whakatipu, Te Anau, Wanaka, and others, would assign to Taupo a first place in lacustrine scenery. It is undoubtedly deficient in almost all the features which distinguish the most admired lakes elsewhere. Its shores are generally low, it has few indentations, bays, or sandy coves, few rocky headlands, jutting promontories, or overhanging precipices, and absolutely no foliage on its banks or anywhere near. Only one small island diversifies its vast surface. Nevertheless, it is a grand sheet of bright transparent water, and a charming mirror for the splendid atmospheric effects which form so picturesque a feature of New Zealand scenery, particularly within reach of such mighty rulers of the cloud-world as Ruapehu and Tongariro. The scenery in connection with these mountains at the south end of the lake has already been alluded to. At the northern end, within three miles of Tapuaeharuru, is the much smaller Tauharu Mountain, which may be easily ascended in a couple of hours, and which affords a sweeping bird's-eye glance over the whole hot-spring and lake country as far as the Bay of Plenty. The lively stream of Waikato, with its numerous rapids, occasional bold cliffs, and little wooded islets, are also inviting objects for tourists. The most remarkable object of all, however, is the Huka Fall, which would be considered a fine one in any part of the world, though far exceeded in size by many. The river, which immediately above is about two chains wide, and of the exquisite transparent green which distinguishes most rivers which flow from deep lakes (and particularly the upper portion of the Waikato), after brawling in rapids and eddying in reaches for a few miles, is suddenly pent in between perpendicular walls of rock some 50 or 60 feet high, and not ten paces apart. Between



these the whole descending river rushes for a distance of two or three hundred yards, churned into a mass of snow-white foam, and roaring with the hoarse voice with which great cataracts are gifted, till, the confining walls suddenly receding, it shoots forth as if out of the barrel of a gigantic gun, and plunges in a solid white mass into a dark-green pool that lies waiting for it below at a depth of 50 feet perpendicular. A party of upwards of seventy Whanganui Natives, on a visit to Taupo, are said to have challenged the resident Natives of Tapuaeharuru to descend the Huka in canoes. The residents thought discretion the better part of valour; but the Whanganuis, in a fit of bravado, made the attempt. Their canoe was sucked under the moment it reached the foaming gorge, and only one Native, who leaped ashore, was ever seen again.

The next group of springs worthy of notice is at Orakeikorako, about twenty miles down the Waikato River. It presents one of the most remarkable groups of hot springs and fumaroles in the Lake Country, or anywhere in the world, and is capable of varied adaptation to sanatory purposes. The banks of the river for several miles, both above and below, consist of steep and broken terraces, from every part of which, at a distance of only a few yards from each other, there burst out jets of steam or runlets of hot water. Hochstetter, when there, counted seventy-six steam jets at one glance of the eye, and at some seasons of the year more may be seen. The principal open *waiariki* or bath is a very remarkable one. It lies immediately beneath a Native village, which crests the high bank on the top of extensive old fortifications. A strong geyser, some 100 yards back from the river, has created a silicious terrace, called by the Natives Pahu Kowhatu, constructed in much the same manner as those in Lake Rotomahana, but of less extent and elevation, and less curiously carved or terraced. At the top of this structure, which is at right angles to the river, are three principal *puias* or *ngawhas*, much resembling those at Tokaano. The farthest from the river, which has been the parent of the whole terrace, is in a state of constant and violent ebullition, at a temperature of about 202° (Hochstetter). The next to it, the temperature being reduced to bearable heat, contains a most perfect natural "Sitz-bath," with elbow rests and a polished seat, let in as it were into the shallower and wider cistern which surrounds it. One peculiarity of this bath is that in a very few minutes of immersion it covers the body with a most exquisite varnish or coating, quite invisible to the eye, but as smooth as velvet, and which gives the bather the feeling of being the most "polished" person in the world. This I do not remember to have perceived in any other of the hot springs in which I bathed. It was a sensation of Paradise to sit in this bath after a long and hot day's travel, watching the full moon rising above the craggy ridge of the lofty river banks, and gradually dispersing the dark shadows of the cliff which lay all along the deep eddying river below.

A stalactite cave is to be visited on the opposite side of the river; but without a Native guide it is not easy to find, and the Natives being all absent from the village I had not the opportunity of seeing it, but it is said to be worth a visit.

About ten miles below Orakeikorako, and about two miles above Niho-o-te-Kiore, or the Rat's Tooth (where the river is crossed by a bridge), near to the Constabulary post, is an extremely beautiful waterfall, called the Rainbow Fall. A long and rapid reach of the river, of a breadth of two or three chains, suddenly turns at right angles to its course, and dashes headlong over a ledge of purple rock, rolling past a wooded islet in the centre of the fall, in broad green waves and lumps of foamy white, over which hangs suspended the beautiful rainbow, which gives it its name. Below, the river widened out runs deep and swiftly through a large pool, in which is another islet covered with the greenest foliage,

kept fresh by the ever-descending spray. A few hundred yards below, on the eastern side of the river, and at its very margin, is a moderate-sized cistern of hot water, capable of containing fifteen or twenty bathers, if close packed. The facilities of this spot for bathing are not very great; but the combination of the picturesque Rainbow Fall and the neighbouring Powhatu Roa, a gigantic pyramidal rock of 500 feet high, rising all alone from the bare level plain, and with a tradition of Maori history attached to it, might afford inducement sufficient for a moderate-sized establishment.

From Niho-o-te-Kiore the road to Rotorua Lake leaves the Waikato River altogether, and the rest of that river's course is, I believe, westward of the limits of the hot-spring district, as defined by Hochstetter. The road is uninteresting till within a couple of miles of Rotorua, when, after crossing a low ridge, it suddenly brings the traveller into the midst of a great group of most curious and repulsive-looking mud volcanoes, boiling in a sluggish and most laborious manner like a very thick soup, and surrounded each by a viscous flooring of the same material, diversified with little spitting craters, from each of which sputters up a supply of the thick half-fluid mass. It looks like the natural home of a family of huge, ugly, bull-frogs, who, were it not for the heat, would doubtless have been placed there by Nature to sprawl and croak and enjoy their slimy life. Though wonderful evidences of the fiery action going on below, they afford little attraction in their present condition for sanatory experiment. I would be sorry to say, however, that they will never be utilized for such an object. A good many years ago a quack doctor travelled over England advocating as a cure for all diseases the burying of his patients up to the neck in the earth. A beautiful young girl who accompanied him used to be immured as an example. She was afterwards known to the world as the celebrated Lady Hamilton, whose name is historically connected with that of Lord Nelson. Though the man was a quack, his remedy is said to have been efficacious, and possibly the mud *puias* of Rotorua may some day be found capable of similar application.

In front, at a distance of a mile, lies Rotorua Lake, with the Native village of Ohinemutu jutting into it on a long narrow headland, and away across three miles of water is the island Mokoia. This is the scene of Mr. Domett's poem of "Ranolf and Amohia," in which, with a warmth of sentiment and fervour of expression of quite 212°, he has endeavoured to clothe savage life and character with charms and dignity which it would be difficult to recognize in the realities of any Maori pa on the shores of Rotorua at the present day, and which probably never had any existence except in the romantic day-dreams of the poet. I am bound to express, however, my admiration of the truthfulness and splendour of his descriptions of the scenery, and the thorough New Zealand atmosphere in which he has enveloped his, in many parts, beautiful tale.

Rotorua affords facilities for bathing "in the open," on the largest scale of any single place in the hot-spring districts. The whole bay in front of Ohinemutu (Ruapeka), some hundred yards across, has a temperature of from 50° to 110°, according to the set of the wind and proximity to the hot springs by which it is fed. These exist chiefly at the neck of the promontory on which the village stands, where they bubble, hiss, gush, and run into the cooler water of the lake. Others emerge through the soft silicious bottom of the lake itself, and the bather is not unfrequently made aware of their presence by the sudden sting of a boiling jet when he sets down his foot. This, however, is not attended with any bad consequences if he catches up his foot instantly, as he is pretty sure to do. This bay is the daily resort, morning and evening, of the whole population of the neighbouring village, and it is capable of accommodating regiments of soldiers at



one time. It affords the finest conceivable opportunity of establishing a great sanatorium for Indian regiments.

There are isolated hot springs in other places near to the village, which could be easily adapted for bathing purposes. At a distance of a couple of miles is a group of most remarkable *puias*, the principal of which, Whakarewarewa, occasionally throws up a column of hot water to a height of 50 or 60 feet. Several others sputter, hiss, and heave in the same neighbourhood. These might, I think, be all utilized by a little hydraulic skill. At any rate, Ohinemutu and its surroundings can hardly fail to become one of the principal bathing-places in the country.

Leaving Ohinemutu by a new road which the Government of the colony is at present (1874) constructing, and passing by Tikitapu Lake, with its waters of sapphire blue, and the more homely shores of Rotokakahi, Wairoa, at the head of Lake Tarawera, is reached. From this spot guides and canoes are taken for the trip to Rotomahana and the celebrated White and Pink Terraces. After a sail or paddle across the very picturesque Tarawera of six or eight miles, and a walk of a couple of miles, or a pull up a narrow creek for the same distance, the foot of the great Tarata is reached.

It is not my intention to dilate on the wonderful and beautiful which abound in connection with Rotomahana and its terraces. I wish rather to draw attention to the different groups of springs, with a view to their sanitary use. At the same time, the idea that these majestic scenes may one day be desecrated by all the constituents of a common watering-place has something in it bordering on profanity. I would not suggest that their healing waters should be withheld from the weary invalid or feeble valetudinarian. Doubtless their sanatory properties were given them for the good of suffering humanity, and that they should become the Bethesda of New Zealand would detract nothing from the sanctity and grandeur. But that they should be surrounded with pretentious hotels and scarcely less offensive tea-gardens; that they should be strewn with orange-peel, with walnut shells, and the capsules of bitter-beer bottles (as the Great Pyramid and even the summit of Mount Sinai are), is a consummation from the very idea of which the soul of every lover of nature must recoil. The Government of the United States had hardly become acquainted with the fact that they possessed a territory comprising similar volcanic wonders at the forks of the Yellow River and Missouri, than an Act of Congress was passed reserving a block of land of sixty miles square, within which the geysers and hot springs are, as public parks, to be for ever under the protection of the States; and it will doubtless take care that they shall not become the prey of private speculators, or of men to whom a few dollars may present more charms than all the finest works of creation.

I will endeavour, as briefly as possible, to describe the principal features of Rotomahana, premising, however, that no description can convey a correct idea of what they are. A day spent among them is a new sensation, and must be felt to be understood.

The Tarata, or White Terrace, rises by a succession of chiselled steps, varying in height from 1 to 6 or 8 feet each, till it attains an elevation of about 80 feet above the lake. Here, backed up by a semicircular wall of red rock, on the level plateau of the uppermost terrace, is the great boiling *puia*, the downward flow of whose waters, impregnated with impalpable white silicious sediment, has, in the course of centuries, deposited the "tattooed" rockwork of which the Tarata is composed, and from which it has its name. This great boiling *puia* at the top is intermittent, and dependent, it is said, in that respect, on the direction of the wind, which, however, may be doubted. At times it sinks into its perpendicular funnel, leaving its rocky sides bare for hours. At other times it throws its water

up to a height of 10 or 15 feet, till it gradually fills up its crater, and overflowing its beautiful-rounded lip glides down in endless broken ripples over the faces of the descending terraces till it reaches the lake below. In the course of its descent it fills a great number of cisterns between the different walls of the terraces. The water deposited in these is of the most exquisite turquoise blue, or something more beautiful than that, and there it lies semi-transparent and still, surrounded in every instance by a beautifully-defined and often sculptured rim of the nearly snow-white rock of which the terrace is composed. I say nearly snow-white, because it appears so in the bright sun and at a little distance, but when close at hand and looked down upon, it is seen to have a delicate, almost imperceptible, rose colour, which spreads over it like a blush on the human face, or still more resembles the tinted marble of some modern sculptors.

The temperature of the various cisterns in the terrace depends partly on that of the surrounding atmosphere, but chiefly on the length of time which may have elapsed since the overflow of the boiling *puia*. When it overflows, the cistern next to it and on the same level, which is only separated from it by five or six yards of snowy rock, is nearly as hot as itself, and far too hot for the bather, who must then resort to cisterns lower down, and of less size and depth. But when the upper *puia* has not overflowed for some hours, the cistern next to it attains a temperature just cool enough to be pleasantly borne, and perhaps, of all baths in the world, affords to a swimmer the most glorious "header." It is about 10 or 12 yards in diameter, a perfect circle, with a rounded lip overhanging inwards, and its exquisite pale-blue depth (unlike the colour of any other pool) cannot, I believe, be fathomed by any plunge, however energetic. But its greatest charm is that, instead of the sharp shock which goes through one like a knife on diving into a cold pool or the open sea, and which makes the bather feel like getting out again with immense celerity, here he is "lapped in the Elysium" of the delicious wave, at a temperature somewhere about 110°, and would be contented to stay there for any number of hours that circumstances might permit.

The other terrace, Otukapuarangi, commonly known as the Pink Terrace, from its soft salmon-colour, well described by Trollope, lies at the opposite side of the lake. It is, except in the particular of colour, less remarkable than the Tarata, being of much smaller dimensions, and presenting fewer facilities for bathing purposes. It has, however, three cisterns immediately below the great boiling *puia*, which afford three varieties of temperature, all pretty warm, and which have space enough for a considerable number of bathers at once.

Immediately beyond the Great White Terrace, and all along the shore of the lake, and for a distance of some hundred yards back from it, up the broken hill side, there is a vast supply of active volcanic force in various forms of development. Conspicuous among these is the great Ngahapu or Ohopia, a rock-girt circular basin 30 or 40 feet wide, from which a violent geyser of boiling heat is constantly ejected to a height of 10 or 15 feet, enveloped in a perpetual cloud of steam. This great *puia* ever roaring, snorting, hissing, and heaving, and surrounded with gaping fissures, from which dense clouds of steam ceaselessly exhale, contains an unlimited supply of boiling water, which might by artificial channels be made to supply many baths. There are, besides these, hundreds of other outbreaks of hot water and steam on the overhanging hill side. Sighing fountains, grunting fountains, fountains of mud, lucid fountains, fumaroles, and funnels, every imaginable indication of the *ignes suppositi cineri doloso*, which seem to lie within but a few inches of the fragile crust below the traveller's foot. The whole lake of Rotomahana is warm, as its name implies, and the creek which flows from it into Tarawera is full of hot springs every here and there.



I have endeavoured in this imperfect sketch which I have given (and for the details of which I am much indebted to Hochstetter, correcting my own less careful observation) to draw the attention of the Government to the great value of the sanitary provision which nature has made in the district described. It might be, and is probably destined to be, the sanatorium not only of the Australian Colonies, but of India and other portions of the globe. The country in which the hot springs are is not attractive for agricultural or pastoral or any similar purposes; but when its sanatory resources are developed it may prove a source of great wealth to the colony. And not only so, but it may be the means of alleviating much human misery, and relieving thousands from their share of the ills that flesh is heir to. What is required is simply practical skill enough to make water run in pipes where it is wanted, and accommodation for those who may desire to avail themselves of it.

### ACCOUNT OF OHINEMUTU AND LAKE DISTRICT,

*Extracted from "New Zealand, its Physical Geography, Geology, and Natural History," by Dr. Ferdinand von Hochstetter.*

THE Township of Ohinemutu is situated on the shores of Lake Rotorua, the second in size in the Lake District.

Rotorua means hole-lake, or a lake lying in a circular excavation. With the exception of the southern bight, called Te Arikirua, it has an almost circular form, with a diameter of about six miles and a circumference of twenty miles. Almost in the precise centre of the lake the island Mokoia is situated, formed by a conical hill rising about 400 feet above the level of the lake, and with a pa on its top. The circular form of the lake, the island in the middle, the white steam-clouds ascending along the shores, all this might easily induce the observer to take the Rotorua to have formerly been a volcanic crater, while in reality this lake, like all the other lakes of the Lake District, was produced by the sinking of parts of the ground upon the volcanic table-land. The depth of the lake is comparatively but small, perhaps at no place more than five fathoms; it has numerous shallow sand-banks, and the shores also, with the exception of the north side, are sandy and flat. It is 1,043\* feet above the level of the sea. On the south-west side the wood-clad Ngongotaha Mountain towers up to a height of 2,282 feet. This is the highest point of the range of hills encircling the lake. From its summit an extensive view can be enjoyed, reaching to the shores of the Bay of Plenty, and as far as the volcanic island Whakari (White Island), which may be seen emitting immense clouds of white steam.

The principal Native settlement on the lake is Ohinemutu, situated at its western extremity; it is a famous old Maori pa—famous for its inhabitants, and famous for its warm baths. The huts of the village are scattered over a considerable area on both sides of the Ruapeka Bay, and on the slope of the hill Pukeroa, which rises to a height of about 150 feet above the lake. The whares and warepunis, some of them exhibiting very fine specimens of the Maori order of architecture, are ornamented with grotesque wood-carvings, some of them with human figures, intended to represent departed sires of the present generation.

Ruapeka Bay forms the centre of the hot springs. There they seethe and bubble and steam from a hundred places. The principal spring is the Great Waikite, at the south side of the bay. The basin of the fountain communicates with the lake, and it is to the immense quantities of hot water issued forth here

\* In 1881 the Trigonometrical Survey of New Zealand made the altitude 961 feet.

that the whole bay owes its warm temperature, forming an excellent bathing-place. By approaching the fountain, more or less, any degree of temperature may be chosen. The water of the fountain is perfectly clear. For some short moments all is quiet in the large basin, only white steam-clouds ascending from it; then a powerful ebullition succeeds in raising the water to a height of from 4 to 6 feet, sometimes even to 10 and 12 feet. Little Waikite, a few yards above, forms a basin 4 to 5 feet wide, in which the water rises about every five minutes several feet high, sinking down again during the intervals to a depth of 6 or 7 feet. The temperature is about 201° Fahr. In going about between the countless pools of boiling sputtering mud the greatest care has to be taken. Whoever has once involuntarily bathed his feet in steaming water or boiling mud will certainly remember it all his life.

That even more serious accidents are of no rare occurrence is proved by several monuments in the shape of figures carved of wood, which are posted in those places where persons have met with an untimely death.

From the Ruapeka Bay the hot springs continue in a south-westerly direction on the foot of the Pukeroa, along the Utuhina Creek, as far as the small settlement of Tarewa. In this direction there are moreover two small warm ponds, Kuirau and Timara, fed by hot springs, both favourite bathing-places of the Natives. Also on the south and east sides of the Pukeroa steam is seen to ascend from various places. Tabular rocks of silicious deposit, 2 to 3 feet thick, of a mass resembling milk-opal, lie scattered about over the slope and the base of the hill, indicating that the activity of the springs in former periods, especially on the east side of the hill, was far more extensive than now, or that the springs change their place from time to time. The Natives have special springs for bathing, for cooking, and also for washing. On places where only hot vapour escapes from the ground they have established vapour baths, and upon heated ground they have warm houses for the winter season, of which it is said that no vermin of any kind is able to exist in them.

The whole atmosphere in and about Ohinemutu is so constantly impregnated with watery vapours and sulphurous gases as to make them plainly perceptible to the sense of smell. This, however, seems only to improve the physical condition of the inhabitants, for they are known to be an extraordinarily robust set of Maoris.

Two and a half miles distant from Ohinemutu, in a south-easterly direction, is the Native settlement Whakarewarewa, where are springs exceeding those of Ohinemutu in variety and extent. Seven or eight of them are periodical geysers, having, however, their own, as yet, unexplored caprices, as they are not always obliging enough to satisfy the curiosity of visiting travellers. It is said to happen now and then that they all play together. The Natives assert that such is generally the case during heavy easterly gales. One of them, the Waikite, issues from the top of a flat silicious cone, measuring 100 feet in diameter and 15 feet high, which, rising between green manuka and fern-bushes, presents an extremely picturesque sight. The cone consists of white silicious deposit: it has numerous fissures and crevices, which are all incrustated with neat sulphur crystals. The hot vapours, however, issuing from those fissures, smell neither of sulphurous acid nor of sulphuretted hydrogen, but merely of sublimated sulphur. At intervals of about eight minutes the Waikite throws out a column of water 2 or 3 feet thick to a height of 6 to 8 feet. It is in January and February, however, that it shows itself in its full glory, spouting to a height of 30 to 35 feet. A little south-east of the Waikite is the Pohutu; its basin is 12 feet wide; the masses of silicious deposit surrounding it are very extensive, and piled up to a height of more than 20 feet, fissured and broken by numerous cracks. The



sulphur deposits are here still more distinct than on the Waikite. The range of hot springs extends from Whakarewarewa along the course of the Puarenga River, a distance of one and a half miles, to Te Arikirua Bay, on Lake Rotorua. The number of smaller springs, of boiling mud-basins, of mud-cones, and solfataras, which are scattered over this extensive area, must be counted by hundreds.

The scenery of Lake Tarawera—distant about twelve miles from Ohinemutu—surpasses in wildness and grandeur that of any of the other lakes in the Lake District. The word signifies burnt cliffs. Its general form, exclusive of its deep side-coves, is that of a rhombus, with its main diagonal running from west to east. In this direction it is seven miles long, having a breadth of about five miles. The lake is probably very deep, for its shores are mostly rugged rocky bluffs, shaded by pohutukawa trees. The chief ornament of the adjoining landscape is the Tarawera Mountain, with its crown of rocks, divided into three parts by deep ravines. It is an imposing table-mountain, rising on the south-eastern side of the lake to a height of at least 2,000 feet above the level of the sea, and consisting of obsidian and other rhyolitic rocks; and it is not to be wondered at that its dark ravines and vertical sides having given rise to many an odd story in vogue among the Maoris. Lake Tarawera receives the discharges of five small lakes: from the south-east the joint discharge of the Rotomahana and Rotomakariri—the warm and cold lakes; from the north-west the waters of the Okataina and Okareka Lakes; and from the west the Wairoa River, which, flowing from the Rotokakahi, at a short distance from the missionary station, forms a picturesque waterfall 80 feet high, and empties into the lake through a narrow gorge of rocks. The outlet of the Okareka Lake flows underground for half a mile, and forms, where it comes to light again, the charming waterfall of Waitangi.

The far-famed Rotomahana is one of the smallest lakes of the Lake District, being not even quite a mile long from south to north, and only a quarter of a mile wide. Its form is very irregular on the south side, where the shore is formed by swamps. In many places of those swamps warm water streams forth; hot mud-pools are also visible here and there, and from the projecting points muddy shallows covered with swamp-grass extend almost as far as the middle of the lake. At its north end the lake grows narrow, and where the Kaiwaka Creek flows out there are again on both sides nothing but grass-swamps and shallows. Only in the middle the water is deeper, and the shores east and west are high and rocky. It justly bears the name of “warm lake.” The quantity of boiling water running from the ground, both on the shores and at the bottom of the lake, is truly astonishing. Of course, the whole lake is heated by it; but the temperature is soon found to be very different in various places. Where the rising of gas-bubbles indicates a hot spring at the bottom of the lake the thermometer will be often seen to rise to 90° or 100° Fahr., but in the middle of the lake and near its outlet 80° Fahr. may be considered as the mean temperature. In bathing and swimming through the lake the change of temperature is very easily felt, but care must be taken not to come too close to any of the hot springs. The water is muddy-turbid and of a smutty-green colour. Neither fish nor mussel-shells live in it. On the other hand, the lake is a favourite haunt of countless water- and swamp-fowls. Various kinds of ducks, water-hens, the magnificent pukeko, and the graceful oyster-catcher or torea enliven the surface of the water. These birds have their brooding-places on the warm shores, while they have to seek their food in the neighbouring cold lakes. In certain seasons of the year the Natives institute regular hunts; at other times, however, they refuse everybody, even Europeans, the pleasure of shooting, declaring the birds *tapu* (sacred). Numerous observations lead to the conclusion that constant changes are going on

at the Rotomahana; that some springs go dry, others rise; and, especially, the earthquakes, which are felt here from time to time, seem to exercise such a changing influence. The main interest is attached to the east shore, where are the principal springs, to which the lake owes its fame.

Te Tarata, at the north-east end of the lake, with its terraced marble steps projecting into the lake, is the most marvellous of the Rotomahana marvels. About 80 feet above the lake, on the fern-elad slope of a hill from which in various places hot vapours are escaping, lies the immense boiling cauldron in a crater-like excavation, with steep reddish sides 30 to 40 feet high, and open only on the side towards the lake.

The basin of the spring is about 80 feet long and 60 feet wide, and filled to the brim with perfectly clear transparent water, which in the snow-white incrustated basin appears of a beautiful blue, like the blue turquoise. At the margin of the basin the temperature is  $183^{\circ}$  Fahr., but in the middle, where the water is in a constant state of ebullition to the height of several feet, it probably reaches the boiling-point. Immense clouds of steam, reflecting the beautiful blue of the basin, curl up, generally obstructing the view of the whole surface of the water; but the noise of boiling and seething is always distinctly audible. The Natives assert that sometimes the whole mass of water is suddenly thrown out with immense force, and that then the empty basin is open to view to a depth of 30 feet, but that it fills again very quickly. Such eruptions are said to occur only during violent easterly gales. The water possesses in a high degree petrifying or rather incrustating qualities. The deposit is silicious, not calcareous, and the silicious deposits and incrustations of the constantly-overflowing water have formed on the slope of the hill a system of terraces, which, as white as if cut from marble, present an aspect which no description or illustration is able to represent. It has the appearance of a cataract plunging over natural shelves, which, as it falls, is suddenly turned into stone. The flat-spreading foot of the terraces extends far into the lake. There the terraces commence with low shelves containing shallow water-basins. The farther up, the higher grow the terraces, 2 feet, 3 feet, some also 4 and 6 feet high. They are formed by a number of semicircular stages, of which, however, not two are of the same height. Each of these stages has a small raised margin from which slender stalactites are hanging down upon the lower stage, and enircles on its platform one or more basins resplendent with the most beautiful blue water. These small water-basins represent as many natural bathing-basins, which the most refined luxury could not have prepared in a more splendid and commodious style.

The basins can be chosen shallow or deep, large or small, and of every variety of temperature, as the basins upon the higher stages, nearer to the main basin, contain warmer water than those upon the lower ones. After reaching the highest terrace there is an extensive platform with a number of basins 5 to 6 feet deep, their water showing a temperature of  $90^{\circ}$  to  $110^{\circ}$  Fahr. In the middle of this platform there arises, close to the brink of the main basin, a kind of rock island about 12 feet high, decked with manuka, mosses, lycopodium, and fern. It may be visited without danger, and from it the curious traveller has a fair and full view into the blue, boiling, and steaming cauldron. Such is the famous Te Tarata. The pure white of the silicious deposit in contrast with the blue of the water, with the green of the surrounding vegetation, and with the intensive red of the bare earth-walls of the water-crater, the whirling clouds of steam, altogether presents a scene unequalled in its kind. The scientific collector, on the other hand, has ample opportunity of filling whole baskets with the most beautiful specimens or the tenderest stalactites, incrustated branches, leaves, &c., for whatever lies upon the terraces becomes incrustated in a very short time.



Altogether about twenty-five large *ngawhas* may be counted on the Rotomahana: the number of smaller springs coming to light at innumerable places upon an area occupying about two square miles it would be difficult to estimate. As these hot springs, according to the experience of the Natives, have proved very effective in the curing of chronic cutaneous diseases and rheumatic pains, there is no doubt that at no very distant period this remarkable lake will become the centre of attraction not only for tourists of all nations, but also as a place of resort for invalids from all parts of the world.

Lake Rotoiti is separated from Lake Rotorua only by a narrow isthmus scarcely half a mile broad. The Ohua Creek, flowing from the Rotorua into the Rotoiti, connects the two lakes. As regards the character of its scenery, Rotoiti is decidedly one of the most beautiful lakes. It is of a very irregular shape, from west to east about six or seven miles long, and only from one to two miles wide. Picturesque promontories and peninsulas jutting far out into the lake separate the various branches and inlets from each other.

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### EXTRACT FROM "AT HOME IN FIJI,"

*By Miss C. F. Gordon-Cumming.*

OHINEMUTU is a Native settlement on the shores of Lake Rotorua, situated in the very midst of boiling springs of every variety. As you look down on the village you catch glimpses of the little brown huts appearing and disappearing through veils of white vapour. The whole country round seems to be steaming, and every step requires caution lest you should carelessly plunge through the thin and treacherous crust of crisp-baked soil into unknown horrors that lie below. If you thrust a walking-stick into the ground the steam immediately rises from the opening thus made. At every few steps you come to a boiling pool, often well nigh concealed by a fringe of rare and delicate ferns of the most exquisitely vivid green—a peculiarity shared by all the plants which flourish in this perpetual vapour bath. In some places a greenish gelatinous or shiny vegetable substance grows in the crevices of the rock where the boiling spray constantly falls. It belongs to the family of algæ, and ranks low in the scale of organization. The marvel is how any form of life can exist in such a temperature. It is the salamander of the vegetable kingdom. Here, as in every other volcanic region I have visited, I am struck by the exceeding coldness of springs and streams lying close to boiling fountains—a system of hot and cold-water baths which the Maoris readily adapt to use, by leading a small conduit from each to a rudely-constructed tank, in which they can regulate the temperature by turning on the hot or cold stream. Some of the ordinary bathing-pools which are not thus artificially cooled are so responsive to the influence of the north and east winds that while these blow the temperature rises from 100° to 190°, and bathing becomes impossible till the wind changes. Very often the wind blows from the north-east every morning for weeks together, and dies away at sunset, when the water, which at noon had reached boiling point, gradually becomes comparatively cool.

The Natives consider these luxurious baths to be a certain cure for all manner of ills, and so they doubtless are; but, as each pool differs from all its neighbours in its chemical combinations, it follows that bathing here at random must be about as unsafe—though decidedly not so unpleasant—as tasting all the contents of a chemist's shop by turns. But a certain number of the pools have been so long tried by the Maoris that their beneficial results are well proven; and

many sufferers—chiefly those afflicted with rheumatism—are carried up here totally helpless; and, in most instances, derive immense benefit from drinking and bathing in these mineral waters.

Of the many thousand hot and cold springs which bubble around us in every direction a limited number only have as yet been analyzed, but these prove that the various chemical combinations are practically without number, no two pools being alike. All the mineral waters of Europe seem to be here represented: Harrowgate and Leamington, Kreutznach and Wiesbaden, and many another; so that doubtless ere long this district will be a vast sanatorium, to which sufferers from all manner of diseases will be sent to Nature's own dispensary to find the healing waters suited to their need.

There are mud-baths containing sulphate of potash, soda, lime, alumina, iron, magnesia, hydrochloric acid, sulphuric acid, sulphuretted hydrogen, silica, and iodine. Other springs contain monosilicate of lime, of iron, manganese, chloride of potassium, of sodium, sulphate of soda and of lime, silica, phosphate of alumina, magnesia, oxide of iron, and various other chemical substances.

All the ordinary cares of housekeeping are here greatly facilitated by nature. She provides so many cooking pots that fires are needless—all stewing and boiling does itself to perfection. The food is either placed in a flax basket and hung in the nearest pool, or else it is laid in a shallow hole and covered with layers of fern and earth to keep in the steam. In either case the result is excellent, and the cookery clean and simple. Laundry-work is made equally easy. Certain pools are set aside in which to boil clothes, and one of these, which is called Kairua, is the village laundry *par excellence*. Its waters are alkaline, and produce a cleansing lather; and they are so soft and warm that washing is merely a pleasant pastime to the laughing Maori girls. No soap is required; Mother Nature has provided all that is needful. Sulphate of soda, chloride of potassium and of sodium enter largely into her preparations for washing-day.

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REPORT  
ON THE  
MINERAL WATERS OF NEW ZEALAND,

BY

JAMES HECTOR, M.D., C.M.G., F.R.S., Director of the Geological Survey.

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NEW ZEALAND is singularly rich in springs of water that hold mineral salts in solution, and some of these are already noted for their valuable medicinal properties.

Both hot and cold springs are found, the former being with few exceptions confined to the districts of the North Island, where volcanic forces have been active during the last tertiary period, and are not yet altogether dormant. A few thermal springs are found to escape from the upper mesozoic rocks, in localities where the source of heat can only be attributed to chemical decomposition of bituminous matters and sulphides, and in a few instances warm waters spring from palæozoic rock formations in the South Island. The cold mineral springs have a wider distribution, but have only as yet been examined from comparatively few localities.

The mineral waters of New Zealand may be classified, from the analyses that have been made in the Colonial Laboratory, into the following groups :—

*Saline*.—Containing chiefly chloride of sodium.

*Alkaline*.—Containing carbonates and bi-carbonates of soda and potash.

*Alkaline Silicious*.—Waters containing much silicic acid, but changing rapidly on exposure to the atmosphere, and becoming alkaline.

*Hepatic or Sulphurous*.—Waters, the prominent character of which is the presence of sulphuretted hydrogen and sulphurous acid.

*Acidic Waters*.—In which there is an excess of mineral acids, such as hydrochloric and sulphuric acid.

The following is a list of the best-known thermal springs in the North Island, showing the temperature and amount of mineral matters held in solution in each case, as determined by analyses performed in the Laboratory of the Geological Survey Department at Wellington :—

No.	Name and District.	Temp. Fahr.	Solid Grains, per Pint.	Chemical Character.
		Deg.		
1	Ohaeawai, Bay of Islands ... ..	60-116	16.8	Acid
2	Waiwera, Mahurangi ... ..	110	17.7	Alkaline & saline
3	Puriri, Thames ... ..	60	67.1	Alkaline, carbonated
4	White Island Lake, Bay of Plenty ... ..	97-212	1850.8	Strongly acidic
5	White Island Springs, Bay of Plenty ... ..	210	207.7	"
6	Pink Terrace Geyser, Rotomahana ... ..	208	19.3	Sulphurous
7	White Terrace Geyser, Rotomahana ... ..	210	18.0	Alkaline
8	Turikore, Whakarewarewa ... ..	96-120	10.9	Sulphurous
9	Te Koutu Spring, Rotorua ... ..	90-180	9.1	Alkaline
10	Koreteoteo " ... ..	214	13.0	Alkaline, caustic
11	Kuirua " ... ..	136-156	9.9	Alkaline
12	Manupirua, Rotoiti ... ..	107	4.1	Sulphurous
13	Cameron's Bath, Rotorua ... ..	109-115	14.3	Acid
14	Ariki-kapakapa " ... ..	160	6.6	"
15	Perekari " ... ..	130-150	7.0	"
16	Ti Kute " ... ..	100-212	6.1	Sulphurous
17	Te Mimi " ... ..	90-112	3.8	Acid
18	Te Kauwhanga " ... ..	80-100	8.0	"
19	Painkiller Bath " ... ..	204	16.0	"
20	Sulphur Bay Spring " ... ..	90-100	5.6	"
21	Otumuhika (a) Taupo ... ..	100-150	1.5	Sulphurous
22	" (b) " ... ..	150	3.4	"
23	" (c) " ... ..	78	1.2	"
24	Ruahine " ... ..	190	19.1	"
25	Orakeikorako " ... ..	90-106	10.6	Acid
26	McMurray's Bath " ... ..	126	4.2	Sulphurous
27	Alum Cave Spring " ... ..	60	7.1	"
28	Crow's Nest Spring " ... ..	170	18.0	Saline
29	Waipakahi " ... ..	98-120	2.8	Sulphurous
30	Te Hukahuka " ... ..	116	1.8	"
31	Tarawera " ... ..	130	12.5	...
32	Parkes's Spring " ... ..	60	25.1	...
33	Whangape, Waikato ... ..	160-200	6.0	Alkaline
34	Onetapu, Ruapehu ... ..	70	58.0	Saline, ferruginous

1. *Ohaeawai*, Auckland. A group of springs used as baths, seventeen miles from Bay of Islands, the waters of which are acidic, depositing sulphur and alum on cooling. Silica is only deposited as a granular sediment. These springs are chiefly interesting from their being accompanied by an escape of mercurial vapour which deposits cinnabar and metallic mercury. Their medicinal action is tonic and chalybeate, and having a specific alterative action in skin diseases.

*Analysis.—Grains in one Gallon.*

Protoxide of iron	...	...	...	...	2.23
Lime	...	...	...	...	5.97
Magnesia	...	...	...	...	1.15
Silica	...	...	...	...	3.10
Sulphuric acid	...	...	...	...	13.60
Hydrochloric acid	...	...	...	...	66.91
Sulphuretted hydrogen	...	...	...	...	Traces
Fixed alkalies	...	...	...	...	41.66
Ammonia	...	...	...	...	Traces
Organic matter	...	...	...	...	"

2. *Waiwera*, on the coast, thirty miles north of Auckland. A powerful escape of weakly alkaline and saline water, extensively used as baths in rheumatic and dyspeptic complaints; used internally it has also a mild antilithic action. This spring is largely resorted to, and most comfortable accommodation is provided for visitors.

*Analysis.—Grains in one Gallon.*

Chloride of sodium	...	...	...	...	...	116.715
„ potassium	...	...	...	...	...	.091
„ lithium	...	...	...	...	...	Traces
Iodide of magnesium	...	...	...	...	...	„
Sulphate of soda	...	...	...	...	...	.383
Bi-carbonate of soda	...	...	...	...	...	87.513
„ lime	...	...	...	...	...	10.692
„ magnesia	...	...	...	...	...	.954
„ iron	...	...	...	...	...	.683
Alumina	...	...	...	...	...	Traces
Silica	...	...	...	...	...	2.464
						<hr/> 219.495

3. *Puriri*, about ten miles from Grahamstown. A cold effervescent water, having valuable properties from the presence of a large percentage of alkaline carbonates. It is bottled both as still and aerated water, and is coming into repute as an antilithic aperient, and would probably be useful in cases of acid dyspepsia and in disorders of the kidney and bladder. In chemical properties it approaches very closely to Fachingen and Ems' waters, of Nassau, in Germany.

*Analysis.—Grains in one Gallon.*

Chloride of sodium	...	...	...	...	...	21.938
Iodide of magnesium	...	...	...	...	...	Traces
Sulphate of soda	...	...	...	...	...	.940
„ potash	...	...	...	...	...	4.938
Carbonate of iron	...	...	...	...	...	Traces
Bi-carbonate of lime	...	...	...	...	...	28.506
„ magnesia	...	...	...	...	...	25.625
„ soda	...	...	...	...	...	452.393
„ lithia	...	...	...	...	...	Traces
Silica	...	...	...	...	...	2.772
Phosphoric acid	...	...	...	...	...	Not determined
						<hr/> 537.112

4-5. *White Island*.—A conical island in the Bay of Plenty, formed by the summit of an extinct volcanic mountain rising out of deep water. The crater is occupied by a lake of strong mineral water, which is fed by intermittent geysers and boiling springs which surround it. All these waters are intensely acid, and deposit sulphate of lime, while the accompanying vapours form extensive deposits of pure sulphur. These waters are too powerful to be used medicinally in their natural state, but might be turned to valuable account in certain chemical manufactures.



## ANALYSES NOS. 4 AND 5.—GRAINS IN ONE GALLON.

Grains.				Grains.			
Sulphate of iron	...	...	1,163.980	Sulphate of lime	...	...	115.933
"    soda	...	...	680.325	"    soda	...	...	9.240
"    potash	...	...	297.124	"    magnesia	...	...	29.120
"    lime	...	...	251.682	"    potash	...	...	Traces
"    magnesia	...	...	66.312	"    protoxide of iron	...	...	23.573
"    alumina	...	...	87.668	"    alumina	...	...	Traces
Sesquichloride of aluminum	...	...	1,870.085	"    ammonia	...	...	Traces
Silicious matters	...	...	23.628	Silicic acid, free	...	...	9.013
Hydrochloric acid, free	...	...	10,409.589	Sulphurous acid	...	...	Traces
			14,850.393	Phosphoric acid	...	...	Traces
				Sulphuric acid, free	...	...	11.933
				Hydrochloric acid, free	...	...	9.706
							208.518

## ROTORUA DISTRICT.

6-20. Are associated geographically as all coming from the famous Rotorua and Rotomahana Districts. They present considerable variety in quality, but may be classed as follows:—

6-11. Alkaline and silicious waters. These differ from the ordinary alkaline waters in the presence of silicic instead of carbonic acid as the combining agent. They are remarkable from their building extensive mounds and terraces composed of silica deposited by the cooling water, and involving as it solidifies a certain amount of granular silica which is held in mechanical suspension. In this manner the wonderful White and Pink Terraces of Rotomahana, and the domes of Whakarewarewa, have been formed. When used as baths they have an undoubted alterative action, and are especially useful in rheumatic affections, especially in gouty constitutions. This is probably due to the specific action of silicates in promoting the discharge of uric acid from the system, as has lately been pointed out by French chemists.

12. This water, which is reported to possess valuable curative properties in rheumatic affections, has an intermediate character, and is allied to the first group owing to the small amount of salines and the presence of alkaline silicates in moderate quantity, but it differs from that group in its deficiency of sulphates, and being harsh to the feel.

13-20. Acidic waters. In the case of these waters carbonates are wholly wanting, and the alkaline salts are formed by a mineral acid, either sulphuric or hydrochloric. In some cases, such as 13 and 14, and 17 to 20, the acid is greatly in excess, forming a bath which has a powerful action upon the liver, and upon diseases dependent on the derangement of that important organ. In Nos. 16, 18, and 19, the presence of sulphurous and hydro-sulphuric acid gives these baths great efficacy in cutaneous diseases. The following notes describe the springs from which samples Nos. 6-20 were collected.

No. 6.—Otukapuarangi, the Pink Terrace of Rotomahana. This terrace has been built up round a great circular pool 180 feet in diameter, from which there is a strong outflow of clear bright water, having a temperature of 204° to 208°, and depositing silicious sinter of a delicate pink tint in large quantities. As received the water was faintly acid, changing to alkaline when boiled.

No. 7 is the water from Te Tarata, or the spring which forms the great White Terrace of Rotomahana. This is a true geyser, having a large crater-shaped basin 90 feet in diameter, the lip of which is about 70 feet above the level of the lake.

The basin is emptied by an explosive effort, which throws the water to a

height of 40 feet, emptying the basin, which again fills up rapidly. The water trickles over the ledges of the terrace, depositing fresh layers of silicious sinter as it cools in its progress to the lake. The water in the basin has a deep azure blue colour, and a temperature of  $210^{\circ}$  Fahr.

As received at the Laboratory the water was faintly turbid, but without any deposit, colourless, and having an alkaline reaction.

No. 8.—From Ture-Kore or Wakarewarewa, two and three-quarter miles from Ohinemutu. The sample was taken from a waterfall which drains from a large pond 300 yards long, the reservoir of a number of boiling springs that are in continual activity. The temperature of this fall is from  $96^{\circ}$  to  $120^{\circ}$ . The water is of a dirty-brown colour, and is in great repute among the Maoris for the cure of all cutaneous diseases. As received it was clear and colourless, with a faintly acid reaction, which changes to alkaline on boiling the water.

No. 9.—From Tapui Te Koutu, three-quarters of a mile from Ohinemutu, a large pool, 60 to 80 feet deep. The usual temperature of the water in this pool is from  $90^{\circ}$  to  $100^{\circ}$ , with westerly or southerly winds; but if the wind changes to north or east the water rises 4 feet in level, and the temperature increases to  $180^{\circ}$ , with a strong outflow. Thick masses of slimy confervoid plants line the bottom of the pool. As received the water was clear and colourless, with an alkaline reaction.

No. 10.—From Koroteoteo, or the "Oil Bath," at Wakarewarewa. This is a strong boiling stream, the recorded temperature being  $214^{\circ}$  from two springs, one of which, surrounded by beautiful sulphur incrustations, throws a powerful jet to a height of 20 feet. The water is distinctly alkaline (or slightly caustic), which is probably the reason for its being termed an "oil bath."

No. 11.—From Kuirau, in the Native Village of Ohinemutu, on the shore of Rotorua Lake, where a strong stream flows from a number of hot springs which cover an extent of about thirty acres. This has a temperature of from  $136^{\circ}$  to  $156^{\circ}$ , and is so soft that clothes can be washed in it without the use of soap. It deposited a white flocculent sediment in the bottles, leaving the water clear, with a faint yellow tint, and an alkaline reaction.

No. 12.—Manupirua, on the south-east shore of Rotoiti, a beautifully clear pool 20 feet in diameter, having a temperature of  $107^{\circ}$  to  $110^{\circ}$ , at the foot of a high pumice cliff on the shore of the lake. The water is clear, with a bluish tinge, harsh to the touch, and deposits sulphur. This pool has a strong outflow of 40 or 50 gallons per minute, and is reported to have great curative properties.

No. 13.—Cameron's Bath, situated in the same locality as No. 6. It is a muddy pool 20 feet in diameter, having a temperature of  $109^{\circ}$  to  $115^{\circ}$ , but kept in a state of ebullition by a powerful escape of gas, which causes faintness when inhaled. The pool has no outflow, and the water is a dirty chocolate colour. As received the water had a persistent acid reaction and offensive odour, and had deposited a silicious sediment in large quantities.

No. 14.—From Arikikapakapa, two miles from Ohinemutu, is a small pool with a strong outflow, having a temperature of  $160^{\circ}$ . It deposits sulphur, and is surrounded by a great number of other baths and mud volcanoes. It is reported to have powerful curative properties. It was colourless as received, with a heavy deposit of silica, and had an acid reaction, which was permanent at its boiling point.

No. 15.—From Perekari, one and a half miles from Ohinemutu. Temperature of water,  $130^{\circ}$  to  $150^{\circ}$ . A boiling pool in a sand-spit near the lake, in which the water is discoloured, and has a very offensive smell. As received it was clear and colourless, with a strong acid reaction, and had deposited a great deal of sediment, which consisted of nearly pure silica.



No. 16.—From Te Kute, the “Great Spring,” ten and a half miles from Ohinemutu, a pool three-quarters of an acre in extent, having a temperature varying from 100° to 212° in various parts. It boils furiously, and dense volumes of steam are continually rising from it. The water is of a muddy brown colour, and contains a large proportion of sulphuretted hydrogen, and is reported to be wonderfully efficacious in cases of rheumatism and cutaneous diseases.

No. 17.—From Te Mimi, Okakahi, a waterfall having a temperature of 90° to 112°. It drains from the preceding (No. 14), and only differs from it in being more dilute, and having a larger proportion of sulphuric acid and less sulphuretted hydrogen.

No. 18.—From Te Kauwhanga mud-bath, one and a quarter miles from Ohinemutu. A thick, brown, muddy water, covered with an oily slime, and having a temperature of 80° to 100°. When received it had deposited a heavy muddy sediment, and had a persistent acid reaction and an offensive odour.

No. 19.—From Kauwhanga, one and a quarter miles from Ohinemutu, a powerful sulphur bath, having a temperature of 204°. The water as received was clear and colourless, with a distinct acid reaction, and evolving an offensive odour, and depositing a brownish sediment on being boiled. This bath is reputed to have great curative properties, and is known to tourists as the “Pain-killer.”

No. 20.—Sulphur Bay Spring, on the edge of Lake Rotorua, formed by innumerable small jets forced up through sand, having a disagreeable odour and a temperature from 90° to 100°. This bath is reported to have a powerful action on the skin, owing no doubt to the large quantity of sulphuric acid it contains. As received it was colourless, with a slight flaky sediment.

SUMMARY OF THE RESULTS OF THE ANALYSES OF MINERAL WATERS; Numbers 6 to 20 (ROTORUA AND ROTOMAHANA DISTRICTS).

*Elementary Analysis.*

No.	Temperature.	CONTENTS IN GRAINS PER GALLON.											Total Contents.
		Silica.	Iron Oxide.	Alumina.	Lime.	Magnesia.	Soda.	Potash.	Lithia.	Sulphuric Acid.	Chlorine.	Sulphuretted Hydrogen.	
	Deg. Fah.												
6	204-208	45.66	Traces	.54	5.54	.46	50.01	.66	...	6.33	57.27	...	166.47
7	210-214	39.31	.3	2	.77	.21	67.10	1.81	Traces	4.42	39.36	...	153.30
8	96-120	13.63	.2	1	.77	.45	39.84	.81	...	7.59	33.18	Traces	96.48
9	90-180	20.18	.3	1	.77	.12	32.37	.61	...	3.98	18.63	...	76.37
10	214	25.72	.46	Traces	1.24	.30	39.47	.91	Traces	4.22	40.96	...	113.28
11	136-156	20.09	.1	7	.16	.07	30.01	1.31	...	5.81	28.72	...	86.34
12	107-110	10.31	.4	6	1.41	.31	8.83	.30	...	7.91	4.01	Traces	33.04
13	109-115	7.01	.54	Traces	.81	.38	14.61	.51	...	98.72	7.08	.41	130.07
14	160	18.15	1.49	.2	.91	.43	5.46	.16	...	25.44	2.53	...	54.77
15	130-150	18.17	.3	4	1.01	.62	12.59	.39	...	18.16	6.21	...	57.49
16	90-100	12.40	.82	4.91	.83	.23	5.53	.32	...	19.49	1.59	5.74	51.86
17	90-112	4.12	.1	5	.84	.31	2.09	.07	...	17.22	3.72	.98	29.50
18	80-100	13.86	.7	.38	.54	.84	10.35	.42	...	25.44	7.45	3.19	63.17
19	204	16.09	.14	Traces	1.68	.62	46.36	1.60	Traces	20.72	46.72	2.01	135.94
20	100-212	10.08	1.27	„	1.03	.31	3.94	.04	...	26.04	.84	1.01	44.56

NOTE.—The phosphoric acid present is omitted from this table, but appears in the detailed account of these waters.



These chemical elements exist in the various waters in such combination as to form salts in the following proportions :—

## COMPUTED COMPOSITION.

	RESPECTIVE NUMBERS AS PER LIST.														
	6	7		9	10	11	12	13	14	15	16	17	18	19	20
Silicates of soda ...	...	68.48	16.32	32.12	2.08	2.57	...	...	...	...	...	...	...	...	...
„ lime ...	1.91	1.62	1.61	1.62	3.16	.34	1.51	...	...	...	...	...	...	...	...
„ magnesia ...	1.16	.53	1.14	.40	.76	.12	.77	...	...	...	...	...	...	...	...
„ iron ...	...	.51	.39	.67	.85	.31	.99	...	...	...	...	...	...	...	...
Silica ...	43.95	...	...	...	22.40	18.42	8.53	7.01	18.15	18.17	12.40	4.12	13.86	16.09	10.08
Sulphate of soda ...	1.01	7.84	13.47	7.06	7.49	10.31	11.50	33.47	12.51	26.75	12.66	4.78	23.71	34.37	8.37
„ potash ...	...	...	...	...	...	...	...	.94	.38	...	.59	.13	.77	2.96	.07
„ alumina...	...	...	...	...	...	...	...	traces	.68	traces	11.22	traces	1.46	...	traces
„ lime ...	10.96	...	...	...	...	...	2.43	2.11	2.21	2.45	1.01	2.04	2.04	...	2.50
„ magnesia	...	...	...	...	...	...	...	1.14	1.29	1.86	.69	.93	1.62	...	.93
„ iron ...	...	...	...	...	...	...	...	1.20	3.15	.76	1.73	.23	1.47	...	2.68
Chloride of sodium ...	93.55	62.61	53.61	29.94	66.34	45.70	6.25	...	...	...	...	...	...	59.16	...
„ potassium	1.05	2.87	1.24	.97	1.46	2.08	.47	...	...	.63	...	...	...	...	...
„ calcium ...	...	...	...	...	...	...	...	...	...	...	...	...	...	3.33	...
„ magnesium	...	...	...	...	...	...	...	...	...	...	...	...	...	1.27	...
„ iron ...	...	...	...	...	...	...	...	...	...	...	...	...	...	.25	...
Phosphate of alumina	.54	traces	traces	traces	traces	traces	...	traces	traces	traces	...	traces	...	traces	traces
Phosphoric acid, ...	...	...	...	...	...	...	...	...	...	...	traces	...	...	...	...
Lithia ...	...	traces	...	...	traces	...	...	...	...	...	...	...	...	...	...
Iron oxides ...	traces	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hydrochloric acid, free	...	...	...	...	...	...	...	7.28	2.62	5.38	1.63	3.82	7.66	7.60	.86
Sulphuretted hydrogen	...	...	...	...	...	...	...	.41	...	...	5.74	.98	3.19	2.01	1.01
Sulphuric acid, free...	...	...	...	...	...	...	...	76.79	13.95	...	.77	12.48	7.60	...	18.02
TOTAL CONTENTS...	154.1	144.46	87.78	72.78	104.54	79.85	32.45	130.35	54.94	56.00	48.44	29.51	63.38	127.04	44.52

Iodine was not found in any of these waters, although carefully sought for in them when concentrated.

Lithia, though examined for spectroscopically in each water, was only found in a few of them.

The amount of carbonic acid was not determined, as there was no indication of its presence in quantity in any of these waters. The fact of silica or other acids being in excess in any water at a high temperature is of course unfavourable to the retention by it of carbonic acid.

## TAUPO DISTRICT.

21-32. These waters are all from the neighbourhood of Taupo Lake, and are characterized by having iodine present as a usual constituent, an important element, which is wanting in almost all the waters previously referred to. In general character they are saline and faintly acid, and are suitable for internal and external use as alteratives in scorbutic and tubercular diseases, also in chronic nervous affections and cutaneous eruptions. This is especially the case in Nos. 31 and 32. The composition of these is given in more detail on account of their importance. No. 31 is similar to the cold spring at Labassère (Hautes Pyrennes), which is used in bronchial catarrh, but it is much stronger. No. 32 is a carbonated and slightly effervescent alkaline spring, having a composition similar to that of Luhatschowitz, in Moravia, which is also a cold spring and found useful in chronic mucous inflammations and congested liver and hæmorrhoids.

## ANALYSES OF MINERAL WATERS; Nos. 21 to 30.

No.	Salts Soluble in Water, principally Alkaline Chlorides.	Salts Soluble in Acids, principally Sulphate of Lime.	Silica.	Total Salts.	Loss by Ignition.	Reaction.
21	5.28	.74	7.86	13.88	3.47	Faintly acid.
22	13.88	4.31	9.25	27.44	3.08	"
23	3.85	1.69	2.94	8.48	1.54	"
24	138.07	4.21	10.03	152.31	3.09	"
25	64.72	1.63	18.51	84.86	12.97	"
26	8.13	9.24	15.75	33.12	1.52	Slightly acid.
27	24.12	3.84	28.51	56.47	3.24	"
28	127.62	9.62	6.25	143.49	4.61	Neutral.
29	6.16	3.08	12.33	21.57	4.65	Slightly acid.
30	3.09	4.62	6.10	13.81	3.08	"

The following is the composition, in grains per gallon, of Nos. 31 and 32 (Tarawera and Parkes's Spring), which are both saline waters and chiefly remarkable for the iodine they contain:—

	No. 31.	No. 32.
Chlorine, with bromine traces ...	40.497	56.076
Iodine ...	.714	1.012
Sulphuric acid ...	2.150	2.156
Silicia ...	2.221	16.752
Carbonic acid ...	Traces	35.751*
Alumina ...	.621	...
Iron ...	1.049	...
Lime ...	2.036	1.994
Magnesia ...	.492	.613
Potash ...	3.681	5.675
Soda ...	46.495	80.710
Lithia ...	Traces	Traces
Phosphoric acid ...	...	...
	99.956	200.739

\* The carbonic acid in No. 32 is that which is in a combined form; there is, besides, a quantity of this acid in a free state.

33. Whangape, Waikato, is a hot alkaline water, having a composition similar to those of Puriri and Waiwera.

34. Onetapu Desert, at the sources of the Waikato and Whangaehu Rivers. This powerful spring, which issues at the base of Ruapehu, is so strongly charged with sulphates of iron and alumina as to taint the water of the latter river from its source to the sea, a distance of seventy miles. It is only one of the many mineral springs which occur in the still active volcanic district of Tongariro.

## APPENDIX.

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### “THE THERMAL-SPRINGS DISTRICTS ACT, 1881.”

AN ACT to provide for the Settlement of the Thermal-Springs Districts of the Colony.

WHEREAS it would be advantageous to the colony, and beneficial to the Maori owners of land in which natural mineral springs and thermal waters exist, that such localities should be opened to colonization and made available for settlement: And it is expedient that powers should be given to the Governor enabling him to make arrangements for effecting that object:

BE IT THEREFORE ENACTED by the General Assembly of New Zealand in Parliament assembled, and by the authority of the same, as follows:—

1. The Short Title of this Act is “The Thermal-Springs Districts Act, 1881.”

2. The Governor may issue Proclamations from time to time defining districts of the colony to be subject to this Act, being localities in which there are considerable numbers of the ngawha, waiariki, or hot or mineral springs, lakes, rivers, or waters, and from time to time may vary the boundaries or abolish any of such districts.

3. After the publication in the *Gazette* of any Proclamation defining a district as aforesaid, this Act shall be in force therein, and it shall not be lawful for any person other than Her Majesty to acquire any estate or interest in Native land therein, except by virtue of or through the means prescribed or permitted by this Act.

4. Any such Proclamation shall supersede the operation within the district of any statute at variance with this Act, or with any Act incorporated or partly incorporated herewith, or with any regulations made thereunder.

5. As soon as may be after the issue of any Proclamation under this Act, and after the land has passed through the Native Land Court, the Governor may make arrangements with the Native proprietors for rendering available the territory of the district for settlement by Europeans, and he may from time to time exercise any of the powers following within the district:—

- (1.) Treat and agree for the gratuitous cession, or for the purchase, or for the lease of any land which he may deem necessary for the purposes of this Act, and enter into any contract which he may think fit;
- (2.) Act as agent for the Native proprietors in dealing with intending lessees;
- (3.) Treat and agree with the Native proprietors for the use and enjoyment by the public of all mineral or other springs, lakes, rivers, and waters;
- (4.) Lay out and survey towns, suburban allotments, and farms;
- (5.) Make, stop up, divert, widen, or alter any bridges, ways, or water-courses;



- (6.) Exercise powers of compulsorily taking land under "The Public Works Act, 1876," for purposes of water-supply, or for providing outlet for sewage;
- (7.) Exchange any reserve or public land for other land to be dedicated to the same or different public objects;
- (8.) Execute all deeds and assurances that may be necessary for effectually executing the powers by this Act conferred upon him, and such deeds and assurances shall be valid and effectual against Her Majesty and all persons whomsoever.

6. The Governor also may, with the consent of the Native proprietors, to be ascertained in such manner as he may think fit, do any of the following things:—

- (1.) From time to time set apart and dedicate any of the land within a district for a park or domain, or for any specific purpose of public amusement or recreation, and annul any such setting apart and dedication;
- (2.) Set apart land as sites for schools and places of worship;
- (3.) Set apart cemeteries, and close burying-places already existing;
- (4.) Build any lodge, museum, or other ornamental building;
- (5.) Appropriate any of the land for squares, gardens, or open places, and leave any part thereof for yards or courts to be attached to any houses agreed to be leased;
- (6.) Enclose and plant any of the aforesaid places;
- (7.) Manage and control the use of all mineral springs, hot springs, ngawha, waiariki, lakes, rivers, and waters, and fix and authorize the collection of fees for the use thereof;
- (8.) Erect pump-rooms, baths, bath-rooms, and other buildings for the convenient use of the baths, springs, and lakes.

7. By Order in Council the Governor may from time to time make and enforce orders and regulations for the management, preservation, disposition, and care of land so set apart as aforesaid, and the government of all persons using or frequenting the same, and impose a penalty not exceeding five pounds for a breach of any such order or regulation.

8. A person authorized by the Governor shall receive the license fees, fees for springs or baths, and all other revenue, and shall expend the same in the improvement and maintenance of the town or district whence the fees and revenue arise.

9. "The Native Districts Regulation Act, 1858," is incorporated with and forms part of this Act.

10. Until any town established under this Act shall come under the operation of the ordinary municipal law of the colony, the Governor may appoint a Board, not exceeding five in number, to administer its affairs, and may delegate to it all the powers and authorities vested in him by this Act (except the power of appointing an agent or attorney for the execution of deeds). The accounts of the aforesaid Board shall be forwarded every half-year to the Native Minister, and shall be audited by the Auditor-General.

11. Any lease, not exceeding twenty-one years from its commencement, of land of which the lessee was in actual occupation on the twenty-fifth day of November, one thousand eight hundred and eighty, may, notwithstanding anything in this Act contained, be validated by the Native owners, although such lease was made before a title to such land was obtained by the Native owners through the Native Land Court.

This section shall only apply to the land at Ohinemutu situate between the Lake Rotorua on the north and the road from the Utuhina River to Mrs. Morrison's house on the south, and between the Utuhina River on the west and a line from Mrs. Morrison's house due north to the said lake on the east.

12. If the terms of any arrangement with the Native proprietors are such that the land for the use of settlers is to be disposed of by lease, the Governor may, with the assent of the Native proprietors, to be ascertained as he may think fit, do the following things:—

- (1.) Manage and administer such letting or disposal, but always by public auction or tender:
- (2.) By writing under his hand authorize any person to sign deeds on behalf of Native proprietors, or a Native tribe, found by the Native Land Court to be owners of the land dealt with; and his execution of any deed on behalf of such proprietors or tribe shall vest in the lessee the estate described in his deed;  
Deeds shall be translated into Maori before execution, and a copy given to the Native proprietors or one of them:
- (3.) For the convenience of lessees, appoint one or more receivers of rents, whose receipts shall be effective discharges:
- (4.) Make regulations for the payment of the expenses of the management of the property and the collection of the rents, and for the payment or division of such rents, and for the places, times, and manner of payment to the Native proprietors:
- (5.) Do any other thing necessary for conferring a valid and peaceful title upon a lessee in conformity with the terms of his lease.

13. Nothing in this Act shall abridge or affect the duties, powers, or jurisdiction of the Native Land Court, or the liability of lessees of land, within a district constituted under this Act, to the payment of stamp or other duties payable in respect of land whereof the title is derived through the Native Land Court.

14. Until otherwise ordered by the General Assembly, this Act shall be in force within the Counties of Tauranga and East Taupo only.

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EXTRACTS FROM PROCLAMATIONS OF DISTRICTS UNDER "THE THERMAL-SPRINGS DISTRICTS ACT, 1881."

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*Defining Te Pukeroa-o-Ruawhata Block, 12th October, 1881.*

SCHEDULE.

All that piece or parcel of land situated in the Horohoro and Tarawera Survey District, Provincial District of Auckland, containing by admeasurement about 3,200 acres, more or less, and being called or known as Te Pukeroa-Oruawhata Block. Bounded towards the North-east by Rotorua Lake, from the mouth of the Utuhina to the mouth of the Puarenga Stream; thence towards the East and South-east by the Puarenga Stream aforesaid to Rua-kio-koko; thence towards the South-west and South by lines, 6960 links and 8614 links, to Ngatautara Pa; and thence towards the West by a line, 2395 links, to Te Rere and the Utuhina Stream, to the point of commencement: be all the aforesaid linkages more or less.



*Defining a District in Tauranga and East Taupo, 22nd October, 1881.*

## SCHEDULE.

All that piece or parcel of land containing by admeasurement 616,890 acres, more or less, situated in the Counties of Tauranga and East Taupo; and bounded towards the North-east and North by a line from Otanewainuku to the south-west angle of the Kaikokopu Block; thence by that block to its south-eastern angle; thence by a right line in the direction of Trig. Station 2 (Manawhae) to the western boundary of the Waitahanui Block; towards the East by that block and the Haehaenga Block to the Tarawera River; thence by that river to a point due south of Trig. Station 18 (Maungawhakamana); thence by a line running due south until intersected by a line drawn from Trig. Station 19 (Okahu) to the north-western angle of the Kaingaroa No. 1 Block, and by the said line to the said north-western angle of said block, and by the western boundary-line of that block to its intersection with a line drawn due east from the summit of Paeroa Trig. Station 31 (Waiwhakahihi); towards the South by the last-mentioned line to its intersection with the Waiotapu River; thence by that river to its confluence with the Waikato River; thence by the Waikato River to its confluence with the Orakanui Stream; thence by that stream to its intersection by a line drawn due east from the north-eastern angle of the Te Hukui Block, and by the said line to the said north-eastern angle; towards the West by a right line; thence to the south-eastern angle of the Whakamaru Block at the Waikato River; thence by the said Whakamaru Block to the Whangapoua Stream, and by that stream to the Tikorangi Block; thence towards the South-west by the Tikorangi Block and the Tokoroa Block to a point in a line drawn between Uira Gorge and Poutihi; thence towards the West by that line to the Whaiti and Kuranui No. 1 Block; thence by that block and the Whaiti and Kuranui Nos. 2 and 3, Paengaroa No. 1, and Taumata No. 2 Blocks, to Pwihenua Trig. Station 27; thence by a right line to the summit of Otanewainuku, the point of commencement: exclusive of the Pukeroa and Ruawhata Blocks and land granted to the Church Mission Society at Te Ngae; as the same is delineated on the plans in the District Survey Office, Auckland.

*Defining a District in East Taupo, 24th October, 1881.*

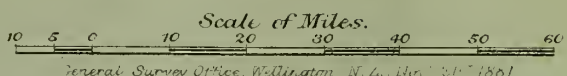
## SCHEDULE.

All that piece or parcel of land containing by admeasurement 29,900 acres, more or less, situated in the County of East Taupo, and bounded towards the North-east by the Wairakei Stream to its confluence with the Waikato River; thence by that river and by the Tauhara North Block for a distance of 34950 links; towards the East and South-east by lines, 1020, 2333, 3561, 6904, 4597, 8065, 8421, 19565, and 24830 links to Lake Taupo; towards the West, South-west, South, and again towards the West by the aforesaid Lake Taupo to the mouth of the Kapara Stream; and towards the North-west by the aforesaid stream and the Oruanui Block to the Wairakei Stream, the point of commencement: as the same is delineated on the plans in the District Survey Office, Auckland.



# MAP OF THE HOT LAKE DISTRICTS OF THE NORTH ISLAND, NEW ZEALAND.

36°



## REFERENCE.

Districts proclaimed under  
"The Thermal-Springs Act, 1881"  
Chief Towns  
Minor Towns & Post Offices  
Roads  
Railways  
Provincial District Boundaries

NAPIER O  
MERCER O

37°



177°





# PLAN OF ROTORUA DISTRICT.

0 1 2 3 4 5 6 7 8 9 10 miles

Road to Tapapa and Cambridge

Road to Tauranga

ROTORUA  
(961 ft above sea level)

ROTO  
ITI

ROTO  
EHU

ROTO  
MA

Kawaha

Kongoluna  
2554 ft

Rotorua  
Township

Whakarewarewa  
Hot Springs

Whakapoukaka  
2624 ft

Whakapoukaka  
2529 ft

Whakapoukaka  
2529 ft

Tarawera R.

TARAWERA  
Kariri

Whakapoukaka  
2529 ft

Whakapoukaka  
2529 ft

Whakapoukaka  
2529 ft

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Whakapoukaka  
2529 ft

Whakapoukaka  
2529 ft

Whakapoukaka  
2529 ft

PROPOSED

Rotorua

Horohoro  
248 ft

Road to Napier

Whakapoukaka  
2529 ft

Whakapoukaka  
2529 ft

Whakapoukaka  
2529 ft

Whakapoukaka  
2529 ft

Whakapoukaka  
2529 ft

Whakapoukaka  
2529 ft

A Nicholson. Drlt

Survey Office Auckland





# PLAN OF THE TOWN OF ROTORUA

Surveyed by A.B. Morrow  
May 1881



S.P. Smith, Chief Surveyor, Auckland Oct. 31







